

Ecology of Riparian Forest Buffers

Understanding the Science Behind Riparian Forest Buffers:
Effects on Plant and Animal Communities

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What Is A Riparian Area

- A riparian area is that area of land located immediately adjacent to streams, lakes, or other surface waters.
- Riparian areas are frequently part of the floodplain.
- Riparian areas differ from uplands because of their high levels of soil moisture, frequent flooding, and unique assemblage of plant and animal communities.
- Through the interaction of their soils, hydrology, and biotic communities, riparian forests maintain many important physical, biological, and ecological functions and provide important social benefits.

Riparian Forest Buffers

- Riparian forest buffers in the eastern United States are among the most productive biological systems in the world.
- Rich soils, abundant moisture, and regular inputs of nutrients and biological materials result in a complex natural communities.
- The loss of riparian forest buffers can result in a loss of habitat for many species of plants and animals, both on land and in the stream itself.

Plant Communities

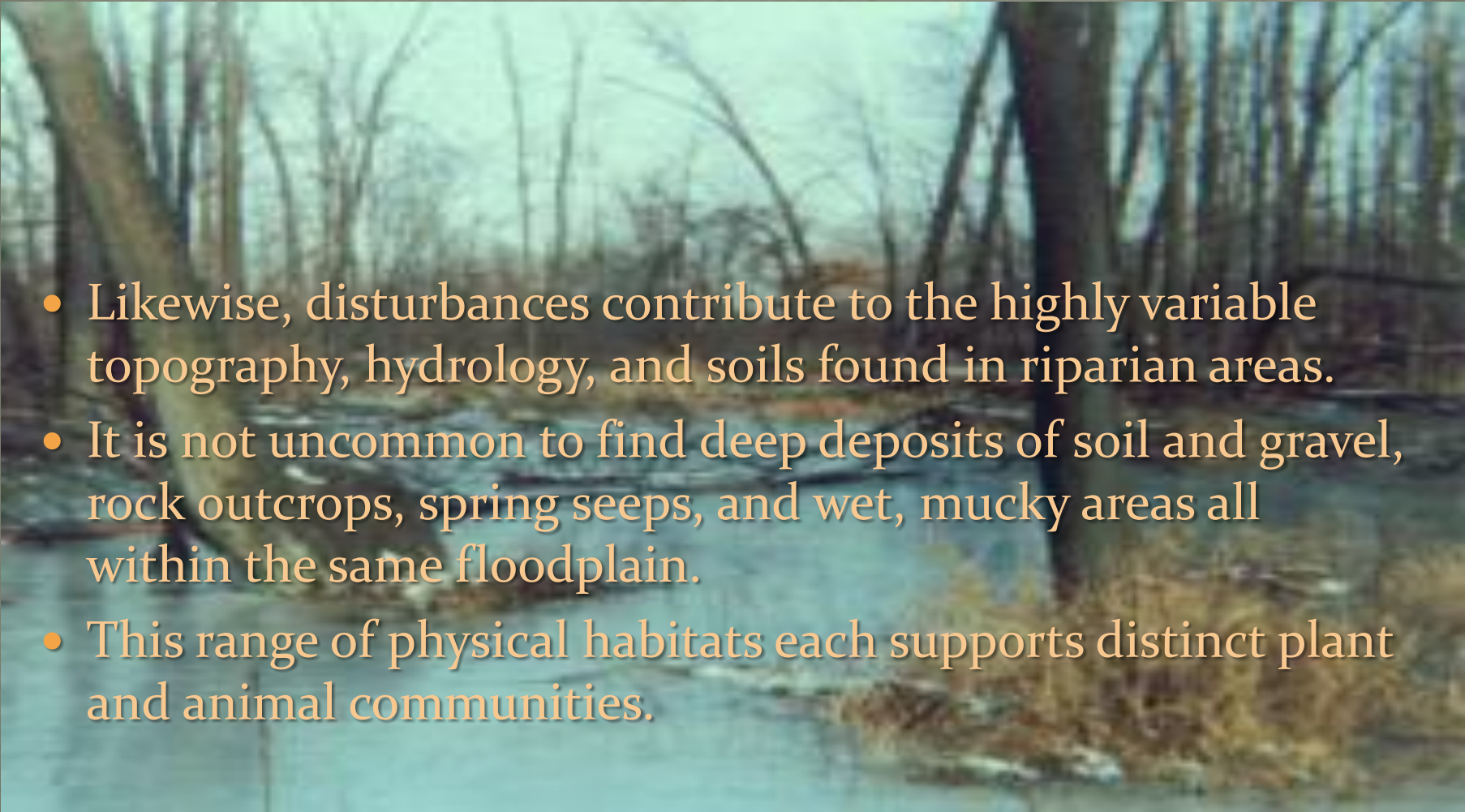
- Riparian forest buffers can support some of the most diverse and productive plant communities.
- Readily available water and productive soils support a greater plant biomass than usually found in upland areas, resulting in forests with a wide variety of species and complex vertical structures.




Plant Communities

- The diverse plant community is also a function of regular disturbance.
- Disturbances are common to the riparian area, due to floods, fire, wind, and pests.
- Disturbances can produce large-scale changes in the plant community, or smaller patchy clearings scattered about the floodplain.
- As a result, young growth and mature vegetation are often found growing in close proximity to one another.

Plant Communities

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- A photograph of a riparian area. In the foreground, there is a shallow stream with a rocky bed. The water is a light blue-grey color. On the right bank, there is a patch of dry, brownish vegetation. In the background, there are many bare, thin trees, likely deciduous, standing in a line. The sky is overcast and grey. The overall scene depicts a natural, undisturbed riparian habitat.
- Likewise, disturbances contribute to the highly variable topography, hydrology, and soils found in riparian areas.
 - It is not uncommon to find deep deposits of soil and gravel, rock outcrops, spring seeps, and wet, mucky areas all within the same floodplain.
 - This range of physical habitats each supports distinct plant and animal communities.

Plant Communities

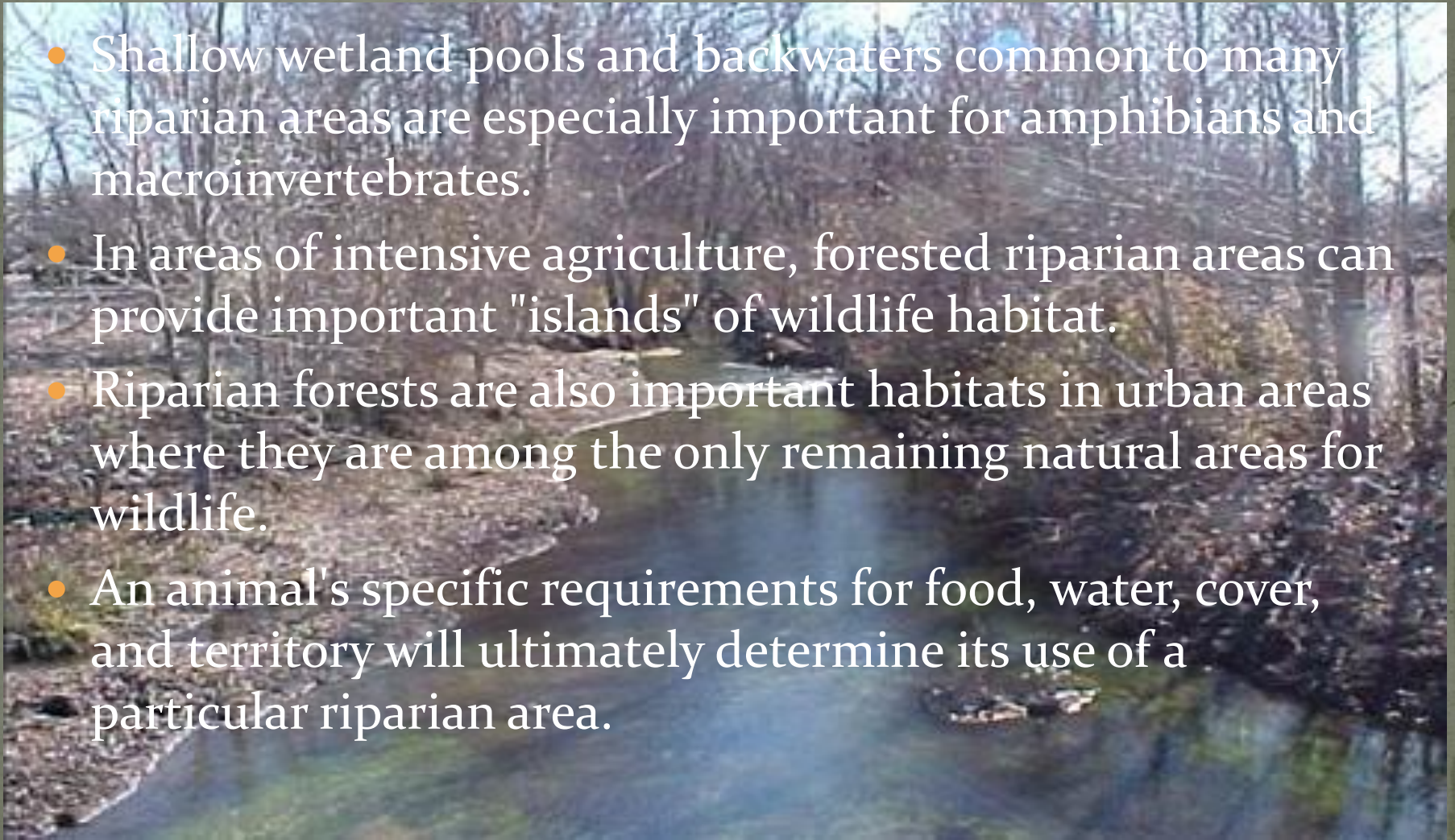
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- Because of their location between the uplands and the stream, there is regular movement of nutrients, sediment, organic matter, and living organisms across their width and length.
 - Riparian areas support large amounts of "edge" habitat, both along the stream and at their borders with adjacent uplands.

Animal Communities

- Riparian areas provide critical habitat for many types of wildlife, because of their diverse and productive plant communities, complex structure, and close proximity to water.
- The more diverse the habitat, the greater its utility to many species of animals.
- Wildlife may be permanent residents of the riparian area or occasional visitors that use the area for food, water, or temporary shelter.
- Riparian areas also provide important travel corridors for some species, and are frequently used as stopover points for migratory birds.

Animal Communities

- Shallow wetland pools and backwaters common to many riparian areas are especially important for amphibians and macroinvertebrates.
- In areas of intensive agriculture, forested riparian areas can provide important "islands" of wildlife habitat.
- Riparian forests are also important habitats in urban areas where they are among the only remaining natural areas for wildlife.
- An animal's specific requirements for food, water, cover, and territory will ultimately determine its use of a particular riparian area.




Animal Communities

- Some studies in areas of intensive agriculture suggest that riparian areas are very important habitats for birds.
- Even very narrow riparian strips (7 feet) can significantly increased the number of birds in the area.
- However, for a riparian forest area to be useful to birds and animals with large territorial requirements, it must be large or connect to large upland tracts of contiguous forest.
- Bird species richness increased with increasing buffer width and were also associated with other habitat features, such as snag size, number of canopy layers, sapling/tree size, and diversity of vegetation.

Animal Communities

- “Area-sensitive bird species” were not found unless there was a corridor of at least 82 feet on both sides of the stream.
- In addition, riparian forests less than 328 feet wide were dominated by short-distance migrants, while forest buffers wider than 328 feet had more neotropical migrant species.
- However, the number of resident bird species, which tend to be “generalists” was not related to the width of the riparian forest.

Animal Communities

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- Width of riparian buffers can greatly impact nest predation and nest parasitism.
 - Narrow buffers tend to be used primarily by "edge" species and those associated with young, brushy, or open stands, such as yellow-breasted chat, indigo bunting, orchard oriole, eastern kingbird, common yellowthroat, and prairie warbler.
 - Wider buffers (164 feet or more) tend to attract birds that commonly breed in mature forests, such as yellow-billed cuckoo, Acadian flycatcher, and red-eyed vireo.

Aquatic Communities

- Removal of forest riparian corridors has affected the stream environments in many ways, including loss of food, habitat, and water quality.
- The creation of forested buffers around streams can help restore these habitats.
- Riparian forests influence the aquatic community through their effects on food availability, habitat diversity, stream flow, light intensity, and water temperature and chemistry.
- These factors determine the productivity and variety of plants, microorganisms, invertebrates, and fish found in the stream.

Aquatic Communities

- Riparian forests provide food for stream organisms in the form of twigs, branches, bark, leaves, nuts, fruits, flowers, and insects falling from the forest cover.
- This organic material is slowly broken down by aquatic microorganisms and stream invertebrates, which form the base of the food chain for larger aquatic organisms such as fish.
- Streamside forests also influence the stream community by modifying the levels of nutrients and dissolved organic matter leaching from the surrounding land.

Aquatic Communities



- Logs provide escape cover for fish, areas for invertebrates to colonize,
- and serve as a source of nutrients for aquatic plants and animals.
- Large woody debris is important to the structure of habitat because it creates deep pools and still backwaters.
- Fish also find habitat in overhanging roots and streamside vegetation.

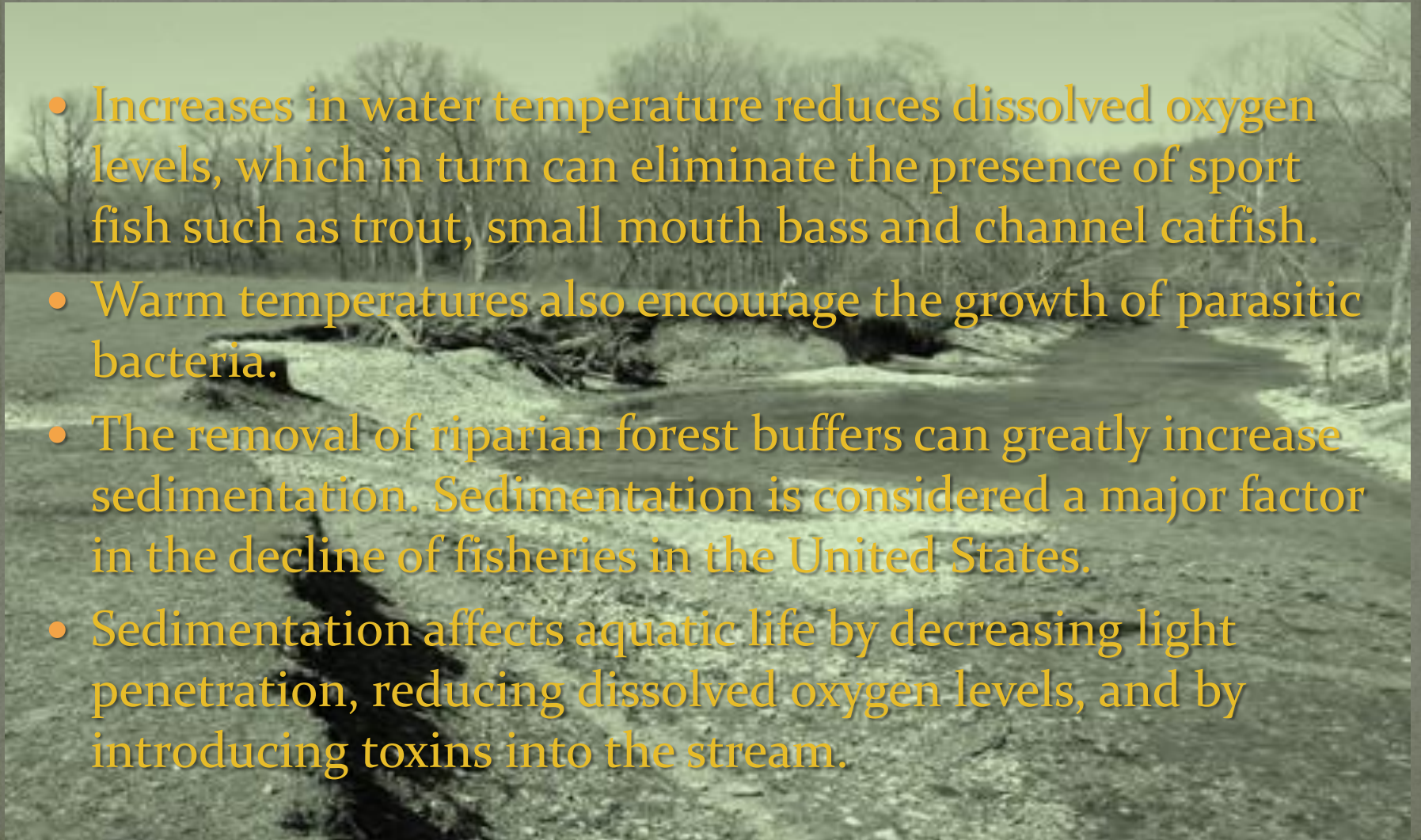
Jamie Glasgow

Aquatic Communities

- Temperature is a critical factor in aquatic ecosystems, affecting both the physical and biological characteristics of the stream.
- Removal of streamside forest vegetation can cause increases in daily and seasonal temperature variation and maximum summer temperatures.
- Higher stream temperatures can reduce the stream's oxygen carrying capacity, increase rates of organic decomposition, and influence the rate at which nutrients are released from suspended sediments.
- Slight increases in temperature can produce substantial increases in the amount of phosphorus released into the water.

Aquatic Communities

- Increases in water temperature reduces dissolved oxygen levels, which in turn can eliminate the presence of sport fish such as trout, small mouth bass and channel catfish.
- Warm temperatures also encourage the growth of parasitic bacteria.
- The removal of riparian forest buffers can greatly increase sedimentation. Sedimentation is considered a major factor in the decline of fisheries in the United States.
- Sedimentation affects aquatic life by decreasing light penetration, reducing dissolved oxygen levels, and by introducing toxins into the stream.



Summary

- Riparian forest buffers maintain many important physical, biological, and ecological functions and provide important social benefits.
- The loss of riparian forest buffers can result in a loss of habitat for many species of plants and animals, both on land and in the stream itself.
- Riparian forest buffers improve and maintain water quality by helping reduce sediment and nutrient loading.